IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Mary Ann Copas, Secretary

Appl. No.	:	09/856,342
Applicant	:	Hermann Brüggendick et al
Filed	:	August 22, 2001
For	:	METHOD OF BURNING A NITROGEN CONTAINING FUEL
TC/A.U.	:	3749
Examiner	:	Josiah Cocks

Customer No: 30996

Board of Patent Appeals and Interference
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

MAIL STOP: APPEALS

Sir:

Appellant hereby appeals to the Board of Patent Appeals and Interferences from the decision dated February 3, 2006 of the Examiner finally rejecting claims 7 – 9, 11, 12, and 16 - 19.

1. According to the requirements of CFR 1.192, appellant herewith encloses an Appeal Brief.

2. The fee of $500.00 is enclosed in payment for filing such Appeal Brief.

3. Appellant does not wish to arrange an oral hearing for this appeal.

If the amount enclosed should be insufficient, please charge the remainder to Deposit Account No. 02-1653.

Respectfully Submitted,

Robert W. Becker, Reg. No. 26,255
for applicant(s)

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APPEAL BRIEF

The Applicants submit the following for their brief on appeal and respectfully requests consideration of same. The Applicants request withdrawal of the rejections made and that the Application be placed in line for Allowance.

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I. REAL PARTY IN INTEREST

The real party in interest in the instant application is the Assignee, Steag encotec GmbH.

II. RELATED APPEALS AND INTERFERENCES

The Applicants are unaware of any related appeals or interferences with regard to the application.

III. STATUS OF CLAIMS

Claims 1-6, 10, and 13-15 are canceled. Claims 7-9, 11, 12, and 16-19 are rejected. Claims 7-9, 11, 12, and 16-19 are appealed.

IV. STATUS OF AMENDMENTS

A final Office Action was mailed February 3, 2006. No amendment was submitted in response to the final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 7 defines a method of burning a nitrogen-containing fuel while reducing the emission of nitrogen oxides (page 1, first paragraph). The method includes the steps of producing a sub-stoichiometric primary zone in the form of a flame core from all of the fuel and primary air (page 4, lines 10-13; page

5, lines 2-4), and supplying the flame core with a nitrogen oxide reducing agent so that the reducing agent is distributed within the flame core (page 5, line 20 through page 6, line 8; page 6, lines 9-16). The reducing agent is a nitrogen compound or a hydrocarbon (page 4, line 22 – page 5, line 8).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claim 7 is anticipated under 35 U.S.C. 102(b) by U.S. Patent No. 4,790,743 to Leikert et al ("Leikert").

2. Whether claim 7 is unpatentable under 35 U.S.C. 103(a) over Leikert et al in view of U.S. Patent No. 4,739,713 to Vier et al ("Vier").

VII. ARGUMENT

A. Rejection of claim 7 under 35 U.S.C. 102(b) over Leikert.

The present invention, as recited in claim 7, defines a method of burning a nitrogen-containing fuel while reducing the emission of nitrogen oxides. The inventive method includes the steps of producing a sub-stoichiometric primary zone in the form of a flame core from all of the fuel and primary air, and supplying the flame core with a nitrogen oxide reducing agent so that the reducing agent is distributed within the flame core, wherein the reducing agent is a nitrogen

compound or a hydrocarbon.

In contrast, the cited reference to Leikert et al discloses a method for burning a nitrogen-containing fuel, while reducing the emission of nitrogen oxides. The Leikert method includes the steps of producing a sub-stoichiometric primary zone 7 in the form of a flame core and also injecting, at a secondary fuel zone 8 outside of the primary flame zone 7, a reduction fuel. This reduction fuel is injected via reduction fuel nozzles 4.

The Applicants respectfully submit that Leikert teaches away from the method of the present invention as defined in claim 7, which specifically defines supplying the sub-stoichiometric primary zone with a nitrogen oxide reducing agent. In marked contrast, Leikert specifically teaches a primary flame zone 7 to which a primary fuel (coal dust) and combustion air are fed. In addition, Leikert discloses that a reducing agent is introduced into its secondary flame zone 8, **not** its primary flame zone 7.

Throughout prosecution of the present application, the Examiner has maintained that the sub-stoichiometric primary zone 7 and the secondary fuel zone 8 of Leikert can be interpreted to be a "flame core" in the sense of the present invention. The Examiner's position is based on the disclosure of Leikert that the secondary zone 8 is "in the vicinity and around the primary flame zone" (column 3, lines 34 - 35 of Leikert) and that the reducing agent supplied by the nozzles 4 of the Leikert burner is "clearly distributed within the flame core formed from the flame zones 7 and 8."

The Applicants strongly disagree. Leikert unambiguously discloses that its reducing agent is not introduced into its primary flame zone 7 but, instead, is introduced around this primary flame zone. The Leikert arrangement is an example of the conventional "fuel staging" approach to NO_x reduction; that is, the Leikert arrangement introduces the reducing agent into a reduction zone that is located downstream of its burner zone, and a remainder portion of the fuel is added at the reduction zone, that is, the fuel itself serves both as a fuel and a reducing agent.

In fact, if the Leikert arrangement were operated as asserted by the Examiner to distribute its reducing agent into its primary flame zone 7 instead of introducing its reducing agent into the secondary zone 8 around the primary flame zone 7, the air to fuel ratio within the secondary zone 8 would be practically the same as the air to fuel ratio within the primary flame zone 7 and there would be no demarcation between the secondary zone 8 and the primary flame zone 7.

This is clearly contrary to the unambiguous disclosure of the Leikert patent itself that its secondary zone 8 is separate and different from its primary flame zone 7.

In addition to this significant and patentable difference relating to the flame core, the NO_x reduction mechanism of Leikert is quite different than that of the present invention. According to Leikert, NO_x is produced in the primary flame zone 7 and reduced in the secondary zone 8. The NO_x reducing agent - i.e., the staged fuel - is introduced through the nozzles 4 to be burned in the secondary

zone 8.

In contrast, in the present invention, the reducing agent is not burned at the location in which it is introduced (the sub-stoichiometric primary zone in the form of a flame core) by reason of a lack of oxygen in this sub-stoichiometric primary zone. Rather, the reducing agent introduced in the present invention reacts directly with the nitrogen oxides within this sub-stoichiometric primary zone.

This different approach of the method of the present invention can be seen in that the introduced reducing agent is in the amount of about 1% of the nitrogen-containing fuel. On the other hand, in the Leikert arrangement, a considerably higher ratio of reducing agent to fuel must prevail, as it would otherwise not be possible to effect a reduction from n = 0.9 in the primary flame zone 7 to n = 0.55 in the secondary zone 8.

In addition, although Leikert discloses that coal dust can be injected into its primary flame zone 7, Leikert does not teach or disclose that coal dust introduced into its primary flame zone 7 is a reducing agent. Instead, any coal dust introduced into the primary flame zone 7 of Leikert merely serves as a primary combustion fuel. The patent to Leikert itself distinguishes between coal dust that is fed into the primary flame zone 7 as a primary fuel and coal dust that is injected into the secondary flame (reduction) zone 8.

The Leikert patent at column 2, lines 44 – 53 discloses that the coal dust for reduction purposes may be differently prepared than the coal dust intended

for primary fuel purposes. Leikert specifically distinguishes that the coal dust introduced into its primary fuel zone 7 is for primary fuel purposes (not reduction purposes) and that coal dust injected into its secondary flame zone 8 is for reduction purposes. Specifically, column 2, lines 57 – 59, states: "The carrier gas for the primary coal dust and/or the reduction coal dust is selected from the group: air, flue gas of the combustion or mixtures thereof."

In fact, increasing the amount of coal dust introduced into the primary flame zone 7 of Leikert would merely change the air to fuel ratio (stated, in column 3, line 61 of Leikert as n = 0.9). Therefore, with Leikert's arrangement, reduction would still be effected in the secondary flame zone 8.

In marked contrast to the Leikert method, the method of the present invention for reducing NO_x does not require that the NO_x reduction is accomplished in a secondary zone and is thus neither anticipated by, nor obvious in view of, the types of systems and methods like that of Leikert. Again, in contrast to the present invention, Leikert teaches that the NO_x is produced in the primary flame zone before the thus-produced NO_x is then reduced in the secondary flame zone.

Again, in contrast, in the present invention as recited in claim 7, the NO_x reducing agent is introduced directly into the primary zone - that is, the flame core at which the combustion fuel and the primary air are fed – so that the NO_x reducing agent is distributed in the flame core. In the event that the respective NO_x reducing agent that is introduced is a hydrocarbon, this hydrocarbon is not a

nitrogen-containing fuel and this hydrocarbon remains practically unburned and therefore does not substantially contribute to the heat production.

Because Leikert fails to disclose these features of claim 7, the rejection under 35 U.S.C. 102 must be withdrawn. Thus, Leikert cannot be an appropriate reference either under MPEP section 2131, which indicates that to anticipate a claim a reference must teach every element of the claim in as complete detail as is contained in Applicants' claim, or under MPEP section 2143.03, since not all of Applicants' claim limitations are taught or suggested.

CLAIMS 8-9, 11, 12, and 16-19

Because each of these claims depends ultimately from independent claim 7, and therefore includes all of the features of claim 7, the Appellants respectfully submit that claims 8-9, 11, 12, and 16-19 also are patentable over the Leikert reference for the reasons set forth above.

B. Rejection of claim 7 under 35 U.S.C. 103(a) over Leikert in view of over Vier

Likewise, Vier, which is combined with Leikert to reject claim 7 of the present application under 35 U.S.C. 103(a), does not disclose supplying a reducing agent to the flame core. The mere fact that Vier teaches that coal dust is known to include nitrogen would not lead one of skill in the art to completely modify the Leikert arrangement, without ANY suggestion from the Leikert

reference itself, and introduce a reducing agent into Leikert primary flame zone 7 instead of its secondary flame zone 8.

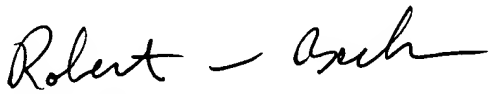
It is respectfully submitted that since the prior art does not suggest the desirability of the claimed invention, such art cannot establish a prima facie case of obviousness as clearly set forth in MPEP section 2143.01. Please note also that the modification proposed by the Examiner would change the principle of operation of the prior art, so that also for this reason the references are not sufficient to render the claims prima facie obvious (see the last paragraph of the aforementioned MPEP section 2143.01).

CLAIMS 8-9, 11, 12, and 16-19

Because each of these claims depends ultimately from independent claim 7, and therefore includes all of the features of claim 7, the Appellants respectfully submit that claims 8-9, 11, 12, and 16-19 also are patentable over the combination of the Leikert and Vier references for the reasons set forth above.

In view of the foregoing discussion, it is respectfully requested that the Honorable Board of Patent Appeals and Interferences overrule the final rejection of claims 7-9, 11, 12, and 16-19 over the cited art, and hold that Appellants' claims be allowable over such art.

Respectfully Submitted,



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VIII. CLAIMS APPENDIX

Copy of Claims Involved in the Appeal:

7. A method of burning a nitrogen-containing fuel while reducing the emission of nitrogen oxides, said method including the steps of:

producing a sub-stoichiometric primary zone in the form of a flame core from all of the fuel and primary air, and supplying said flame core with a nitrogen oxide reducing agent so that said reducing agent is distributed within said flame core, wherein said reducing agent is a nitrogen compound or a hydrocarbon.

8. A method according to claim 7, wherein a temperature of greater than 1100°C is established in said sub-stoichiometric flame core.

9. A method according to claim 7, wherein said sub-stoichiometric flame core is enveloped with a veil of secondary air.

11. A method according to claim 7, wherein said nitrogen oxide reducing agent is introduced into said sub-stoichiometric flame core mixed together with the fuel.

12. A method according to claim 7, wherein said nitrogen oxide reducing agent is introduced into said sub-stoichiometric flame core mixed together with the primary air.

16. A method according to claim 7, wherein said nitrogen oxide reducing agent is a nitrogen compound comprising at least one compound

selected from the group consisting of ammonia, ammonia water, and urea.

17. A method according to claim 7, wherein said nitrogen oxide reducing agent is a nitrogen compound comprising at least one compound selected from the group consisting of natural gas and methane.

18. A method according to claim 9, wherein said veil of secondary air is enveloped within a further veil of tertiary air.

19. A method according to claim 7, wherein supplying said flame core with a nitrogen oxide reducing agent so that said reducing agent is distributed within said flame core includes supplying said flame core with a nitrogen oxide reducing agent so that said reducing agent is uniformly distributed within said flame core.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.